Reinstatement and revision of *Euryomyrtus* (Myrtaceae)

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Abstract

Trudgen, M.E. Reinstatement and revision of *Euryomyrtus* (Myrtaceae). *Nuytsia* 13(3): 543–566 (2001). *Euryomyrtus* Schauer is reinstated and lectotypified. A revision of the genus with descriptions, maps, illustrations and a key is presented. Seven species are recognized for the genus which is endemic to southern Australia, including Tasmania. *Euryomyrtus denticulata* (Maiden & Betche) Trudgen, *E. leptospermoides* (C.A. Gardner) Trudgen, *E. maidenii* (Ewart & Jean White) Trudgen, *E. ramosissima* (A. Cunn.) Trudgen and *E. ramosissima* subsp. *prostrata* (Hook. f.) Trudgen are new combinations, and *E. inflata* Trudgen, *E. patrickiae* Trudgen and *E. recurva* Trudgen are new species. The closest relatives of the genus are considered to be in a natural group which includes *Rinzia* Schauer, *Hypocalymma* Endl., *Ochrosperma* Trudgen and *Triplarina* Raf.

Introduction

As noted in previous papers (Trudgen 1986, 1987), the heterogenous assemblage of species that have traditionally been placed in the subtribe Baeckeinae of the Myrtaceae show significant variation in the morphology of the seeds, fruits and anthers. It was also noted that three supra-generic groups exist within this variation. *Euryomyrtus* belongs in one of these three groups (which also contains *Rinzia* Schauer, *Hypocalymma* Endl., *Ochrosperma* Trudgen, *Triplarina* Raf., *Baeckea crassifolia* Lindl., *B. ericaea* (F. Muell.) Benth., *B. polystemona* F. Muell., *B. tetragona* F. Muell. ex Benth. and some undescribed species) the members of which have "reniform seeds with or without an aril, anthers opening in slits and external filament glands" (Trudgen 1986) and aborted ovules which do not develop into ovulodes.

Euryomyrtus is reinstated here and its seven species are revised. It is distributed in south-western and south-eastern Australia.

Taxonomic history

Euryomyrtus was described by Schauer (1843) who placed it in the tribe Baeckeae, along with twelve other genera that he recognized for this tribe. Bentham (1867) rejected nine of these genera, synonymizing them with *Baeckea* L., although he maintained some of them, including *Euryomyrtus*

and *Rinzia*, as sections of that genus. He placed *Baeckea* in the subtribe "Baeckeaeae" of the tribe *Leptospermeae* with *Scholtzia, Hypocalymma, Astartea* DC. and *Balaustion* Hook.

Niedenzu (1898) maintained *Euryomyrtus* as a section of *Baeckea* (in which he also included *Astartea* and *Scholtzia* as sections) but transferred the related species Bentham had placed in section *Rinzia* to *Hypocalymma*. He thus recognized that *Rinzia* and *Hypocalymma* are related but failed to recognize that the species Bentham placed in his section *Euryomytus* are more closely related to these genera than to the remainder of *Baeckea* as circumscribed by Bentham. Bean (1995, 1997) recognized that *Euryomyrtus* should be considered generically distinct but did not formally reinstate it or lectotypify it.

In their informal classification of the Myrtaceae, Briggs & Johnson (1979) placed *Baeckea* in the *Baeckea* suballiance of their *Chamelaucium* alliance, with *Euryomyrtus* as a section requiring investigation to see if it deserved generic rank. They subsequently (Johnson & Briggs 1985) abandoned suballiances in the *Chamelaucium* alliance and presented a sketch phyllogram of relationships within this difficult group.

Materials and methods

This study was based on the gross morphology of herbarium material supplemented by some observations in the field. The measurements given for the parts of flowers were taken from material that had been boiled in water with a small amount of detergent in it. The measurements of leaves were taken from dry material. A selection of the material examined has been cited, based on location (to cover the range of the species), quality of label information and variation. For poorly collected species all the material seen has been cited.

Terminology. Processes (Trudgen 1986) are the same structures referred to by Carr (1980) as floral trichomes. They also occur in at least some *Rinzia* species and some other members of the natural group to which *Euryomyrtus* belongs.

The inflorescence terms anthopodium, monad, uniflorescence, conflorescence, superconflorescence, brachyblast, auxotelic and anauxotelic are used as defined by Briggs & Johnson (1979). Aril, hypanthium and flower size are used as defined in Trudgen (1986). Testa surface terminology follows Murley (1951) as given in Stearn (1973).

Separation of *Euryomyrtus* from related genera

Within the supra-generic group having reniform seeds, the seven species referred here to *Euryomyrtus* form a coherent subgroup that is sufficiently distinct to deserve generic rank. *Euryomyrtus* can be distinguished from the other members of the reniform-seeded group by having the following combination of characters:

1. Filaments terete (sometimes slightly flattened near the base) and the stamens opposite the petals with longer filaments than those opposite the sepals and between the sepals and petals.

2. Anthers dorsifixed and versatile.

3. When stamen number is reduced, then those stamens opposite the sepals and/or between the sepals and petals are lost rather than those opposite the petals (some of which are lost in *E. ramosissima* subsp. *prostrata* when there are less than 5 stamens).

4. Seeds arillate (the aril in *E. leptospermoides* is very small and may sometimes be absent).

5. Seed testa light brown to brown in colour, except for *E. leptospermoides* in which it is a pale straw colour.

6. Seed hilum small.

7. Flowers with a well developed anthopodium (except *E. inflata*) and a definite (at least 0.5 mm) to well developed peduncle.

8. Bracteoles persistent, subopposite to alternate, broad and overlapping at the base.

9. Brachyblasts bearing 2–4 monads are the predominant inflorescence structure occurring in all species except *E. maidenii* and *E. patrickiae*, which has only axillary monads (these also occur in other species). The brachyblasts are mostly terminal but also occur in leaf axils, particularly when specimens are heavily in flower.

10. The lower 1/3–3/4 of the ovary is fused to the hypanthium.

11. The fruit opens widely (except in *E. inflata*).

Although they are not the only differences, the first two characters separate *Euryomyrtus* from *Rinzia*, the species of which have flat filaments with the anthers attached to their adaxial surface. *Hypocalymma* can also be separated from *Euryomyrtus* on stamen characters as the species referred to it have basifixed anthers.

The arrangement of the stamens in *Euryomyrtus* separates it from *Ochrosperma* and *Triplarina*, which have the stamens predominantly opposite the sepals rather than predominantly opposite the petals. There are also differences in the seeds, as the seeds of species referred to *Ochrosperma* have a pale straw-coloured testa with the papillae arranged in rows while the seeds in *Triplarina* have a reddish testa (my observations for some of the species) or brown testa (as described by Bean 1995) and no aril.

Baeckea tetragona and two allied undescribed species (all three endemic to the south-west of Western Australia) can be easily separated from *Euryomyrtus* on hypanthium and fruit characters. Whereas in *Euryomyrtus* the hypanthium is usually about as broad as long and the fruit opens widely with prominent valves (except in *E. inflata*), in *B. tetragona* and its allies the hypanthium is longer than broad and the fruit does not open widely and does not have prominent valves. The *B. tetragona* group can also be distinguished from *Euryomyrtus* by its smaller seeds without an aril, and its inflorescence is consistently of axillary monads whereas most *Euromyrtus* species have brachyblasts predominating.

The remaining species (*Baeckea crassifolia*, *B. ericaea*, *B. polystemona* and an undescribed species from the south-west of Western Australia) in the larger group to which *Euryomyrtus* belongs can be separated from it on the following basis. All have very reduced peduncles (0.1–0.3 mm); where the

seed is known (no seed of the undescribed species has been seen) it does not have an aril and the papillae on the testa are very small (barely distinguishable at x10); the seeds of two of the species (*B. crassifolia* and *B. ericaea*) have a large hilum (*c.* 1/3 of the length of the seed); while variable (between the species) the bracteoles are dissimilar to those found in *Euryomyrtus* and are opposite rather than sub-opposite/alternate; in three of the species the calyx lobes are infolded after flowering, whereas in *Euryomyrtus* they are not; finally in these four species the inflorescence is consistently of axillary monads and brachyblasts are not present.

Systematic position of *Euryomyrtus*

Briggs & Johnson (1984: 747, figure 10) presented a "sketch phylogram" of their interpretation of relationships within their *Chamelaucium* alliance developed from the information then available to them. This phylogram has six evolutionary lines arising from a putative "standard" ancestor described as "hairs lost, ovary 3-locular, [inflorescence] metabotyoid, hypocotyl>cots." (commas added). One of these six lines has only *Hypocalymma* on it, another only *Balaustion* and a third is more complex with branches for five genera: *Baeckea*, *Astartea*, *Baeckea*, *Thryptomene*, *Micromyrtus* and *Corynanthera*. It has more than one branch to *Baeckea*, to show (as Briggs & Johnson indicated in their text) that *Baeckea* was considered to include more than one genus.

Subsequently, Trudgen (1986, 1987) described the existence of a distinctive seed type in *Rinzia*, *Ochrosperma* and related genera that has a reniform shape, a crustaceous testa and is often arillate. The existence of seeds with this combination of characters has significant implications for unravelling the evolutionary history of the *Chamelaucium* alliance, as in the absence of evidence to indicate otherwise, it should be considered to have only arisen once. To emphasize the importance of this seed type in understanding the phylogeny of the *Chamelaucium* alliance, it only needs to be restated that no other Myrtaceae are known to be arillate.

The reniform/arillate seed type occurs in *Balaustion*, *Hypocalymma*, *Rinzia*, *Ochrosperma*, *Triplinaria*, *Euryomyrtus* and some other small groups of species (see section immediately above) that await definition as separate genera, and is the only seed type that occurs in them. This seed type thus occurs across the three evolutionary lines of Briggs & Johnson's sketch phylogram detailed above. A reasonable hypothesis is that the genera with this seed type belong on one evolutionary line rather than on three lines. It is proposed that these genera all need to be placed on one line arising from Briggs & Johnson's putative ancestor and that relationships in the remaining genera of the *Chamelaucium* alliance need to be re-assessed.

The genera on this line are quite diverse in other characters, including three stamen types (although all have anthers opening in parallel slits), and determining just how *Euryomyrtus* relates to the other genera awaits further research. However, stamen arrangement suggests it is less closely related to *Ochrosperma* and *Triplinaria* than to the other genera. The geographical distributions of the various genera would also support this observation.

Taxonomic revision of *Euryomyrtus*

Euryomyrtus Schauer, *Linnaea* 17: 239 (1843). – *Baeckea* section *Euryomyrtus* (Schauer) Bentham, Fl. Austral. 3: 76 (1867). *Lectotype* (here selected): *Euryomyrtus diffusa* (Sieber ex DC.) Schauer [= *E. ramosissima* (A. Cunn.) Trudgen].

Subshrubs low and straggling to spreading or erect, one species prostrate, glabrous except two species with margin and less frequently surfaces of the leaf lamina scabrid; trichomes shortly subconic, hard, translucent. *Leaves* opposite, appressed to spreading, distant to overlapping, shortly petiolate (sessile or very shortly petiolate in *E. maidenii*); lamina small, entire, planar, plano-convex or concavo-convex, sometimes with a slightly recurved margin, linear to sub-orbicular (tightly involute with a recurved tip and appearing 2-channelled on the adaxial surface in *E. recurva*), acuminate to very obtuse, gland-dotted, discolorous in some species. *Flowers* 1–16 on a branchlet, solitary in leaf axils or 2 or 3(4) monads on terminal or axillary brachyblasts; peduncle terminated by a pair of sub-opposite to alternate, persistent bracteoles; anthopodium prominent except in *E. inflata*. *Bracteoles* not thickened, very concave or cymbiform, deltoid to ovate to broad ovate to cordate to reniform in outline, attachment broad; margins narrow, hyaline or petaline, entire to laciniate (often minutely); centre reddish to maroon or greenish. *Hypanthium* narrowly to broadly obconic to hemispherical to semi-ellipsoid or barrel-shaped, smooth, oil glands obvious in some species. *Calyx lobes* 5, erect to slightly spreading, short and broad, up to *c.* half as long as petals, not or slightly keeled, petaline in some species and usually white, hyaline (and then very narrow) in others, ragged to laciniate; centres often reddish. *Corolla* 3–15 mm diam., white or white tinged with red or various shades of pink or mauve; petals spreading or slightly reflexed, more or less orbicular, claw short or absent. *Processes* in groups of 2–15 at base of adaxial side of petal claws, white or reddish. *Stamens* 3–29, one opposite each petal except when less than 5, usually one opposite each calyx lobe except when less than 10, the remainder between the centres of the petals and calyx lobes, but two species lose those opposite the calyx lobes before those between the petals and calyx lobes. *Filaments* free, terete, slightly flattened near the base in some species, tapering towards and curved inwards at the apex, antepetalous filaments longest and these stamens equalling or just exceeding the calyx lobes in four species, equalling to markedly exceeding them in one species and markedly exceeding them in the remaining species (almost twice their length). *Anthers* dorsifixed and versatile; loculi parallel, opening in slits; connective gland sub-globular to globular or cylindrical. *Ovary* 3- or rarely 4-locular, obovoid, depressed around base of style, lower 1/3–3/4 fused to hypanthium, top equalling staminophore except in one species; placentas axile, slightly raised, elliptic to very broadly oblong, areas on the floral axis (in one species edges free, but not stalked), slit down centres; ovules reniform, 2–6 per loculus, collateral, arranged in rows or in one species arranged around the placenta. *Style* fusiform to cylindric, slender to stout, inserted deeply into the ovary, equalling the calyx lobes or the antepetalous stamens in the species where these markedly exceed the calyx lobes; stigma capitate. *Fruit* a globular or cylindric capsule, equalling the calyx lobes in most species, exceeding them in one and only equalling the staminophore in another (*E. inflata*), fused to the hemispherical to barrel-shaped hypanthium only near the base in most species, pendant in some species, definitely erect in one. *Dehisced fruit* opening widely to very widely in most species, not widely in one (*E. inflata*), hypanthium becoming saucer-shaped when fruit open very widely. *Seeds* reniform, arillate; hilum small, in the centre of the concave side; testa crustaceous, minutely colliculate to colliculate, light to mid brown, straw-coloured in one species. *Embryo* (observed only in *E. maidenii*) filling seed, radical massive, cotyledons flattened parallel to the plane between them, *c.* 0. 4 mm long on a slender neck, neck and cotyledons folded back onto the radicle.

Size and distribution. *Euryomyrtus* is a genus of seven species, one of which has two subspecies. It is restricted to the southern parts of the Australian mainland and to Tasmania, with five species endemic to the south-west of Western Australia (Figure 1), one species occurring in southern New South Wales and one species widespread in Victoria and Tasmania and also occurring in a small area in the eastern part of South Australia and southern New South Wales.

Inflorescence structure. The uniflorescence in *Euryomyrtus* is a monad, and at first seems homologous to the monads developed in some *Rinzia* species. However the bracteoles are not opposite as in *Rinzia* but sub-opposite to alternate (e.g. in *E. leptospermoides* they can be up to 0.5 mm apart) and do not

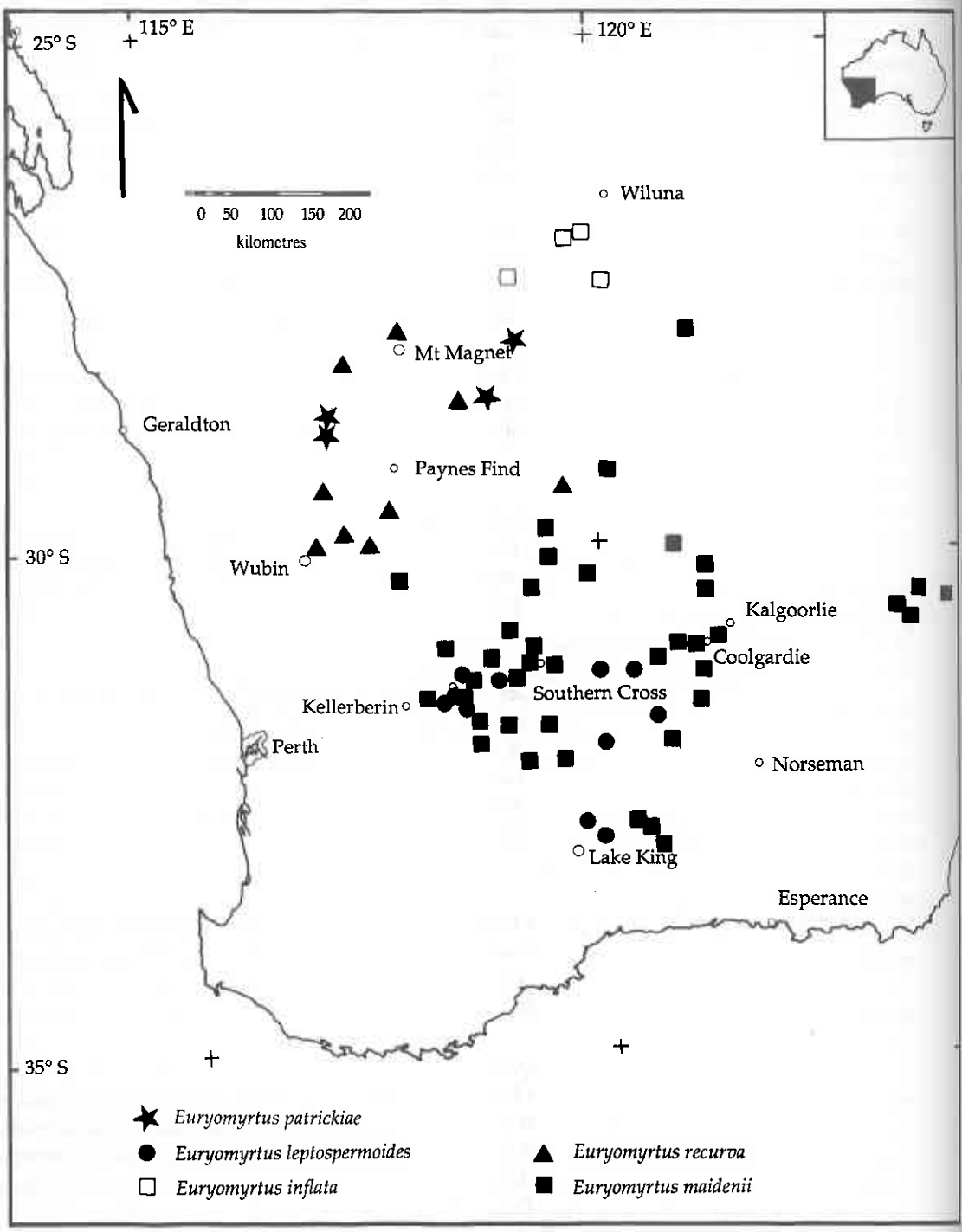

Figure 1. Distribution of the Western Australian species of *Euryomyrtus*.

subtend a distinct articulation as in that genus (there is an articulation but when the flowers fall the peduncle falls with them). Usually two or three (sometimes four) monads are grouped together on a brachyblast, however single monads in a leaf axil with no development of a brachyblast are not uncommon and two species, *E. maidenii* and *E. patrickiae*, have only axillary monads. On one specimen of *E. leptospermoides* (*R.J. Cranfield* 5287, PERTH) what at first appear to be axillary monads have the peduncle subtended by very small bracts; these are in fact axillary brachyblasts bearing only one monad and without the shoot axis developing. Presumably the axillary monads (i.e. a peduncle and flower only, with no axis bearing bracts subtending the peduncle) found in this and other species have been derived from further reduction of the brachyblast axis.

In the terminology of Briggs & Johnson (1979) the 2–4 monads on a brachyblast constitute a conflorescence and a branchlet bearing several brachyblasts a superconflorescence. The brachyblasts are most frequently terminal but also occur in leaf axils along the branchlets. When they are terminal the brachyblasts are auxotelic while those that occur in leaf axils are sometimes anauxotelic.

The inflorescence described above for *Euryomyrtus* has much in common with that described by Briggs & Johnson (1979: 202) for the related genus *Hypocalymma*. However in *Hypocalymma* the brachyblasts are lateral rather than terminal and lateral and are usually anauxotelic and rarely auxotelic rather than the reverse.

The bracteoles in *Euryomyrtus* are attached very broadly to the peduncle and are very concave with the base of the upper bracteole enclosed by the base of the lower bracteole. The overall effect is quite distinctive and is found in all species, although in *E. inflata* the anthopodium is very short and as a consequence the bracteoles are pressed up against the hypanthium and are not as concave as in the other species.

Very occasionally there can be a bud developed in the axil of one of the bracteoles and on one specimen of *Euryomyrtus recurva* some "monads" have an extra bracteole developed near the base of the hypanthium or part way between the pair of bracteoles and the hypanthium. This also happens on some specimens of *E. ramosissima* which can also have an extra bracteole below and at right angles to the sub-opposite to alternate pair. These rare developments and the sub-opposite/alternate arrangement of the bracteoles indicate that the monad in *Euryomyrtus* is the result of a reduction from a more complex structure.

Infrageneric variation. The seven species referred to *Euryomyrtus* can be divided into three groups of related species, one in south-eastern Australia and two in south-western Australia. The morphological differences between these groups and the geographical separation of the eastern group suggest that *Euryomyrtus* is a genus of considerable antiquity.

The eastern group comprises the two species *E. ramosissima* and *E. denticulata*, which appear to be very closely related to each other. They have unthickened leaves which are often discolorous, can have recurved margins (rather like those of some *Rinzia* species), have translucent trichomes on the margins and also have similar flower shape. However they differ in characters such as stamen number (3–10 and 19–25 respectively), ovule number (3–5 and 2 or 3 respectively), the degreee of fusion of the ovary to the hypanthium, the shape of the calyx lobes and the length of the filaments (those of *E. denticulata* are quite long so that the stamens are distinctly exserted).

Also very closely related to each other are two of the western species, *E. leptospermoides* and *E. inflata*, which form the second group. They have leaves that are little thickened but which have no

trichomes, do not have recurved margins and are concolorous. The flowers of this species pair are rather disimilar to those of the previous pair, having the hypanthium hemispherical or barrel-shaped (with a hemispheric base) rather than obconic, more rounded calyx lobes and shorter peduncles and anthopodia.

However, the three members of the remaining western group (*E. maidenii*, *E. patrickiae* and *E. recurva*) seem to be less closely related to one another, although they all consistently have ten stamens. Their leaves are quite different from those of the other two groups. *Euryomyrtus recurva* has tightly involute leaves with recurved tips, while *E. maidenii* and *E. patrickiae* have small, concave-convex, slightly thickened (ericoid) leaves. The latter two species appear to be more closely related to one another than to *E. recurva* but still show significant differences from each other, for example in the size and aggregation of their leaves.

Key to the species of *Euryomyrtus*

1. Stamens 10 or less
   2. Leaves not thickened, sometimes with recurved margins, tip never recurved, usually with short, hard, translucent trichomes (especially on margins) ..... **6. E. ramosissima**
   2. Leaves thickened, margins never recurved, abaxial surface convex, trichomes absent
      3. Leaves channelled on adaxial surface, tip recurved. Ovules 3–5 per loculus ..... **3. E. recurva**
      3. Leaves not channelled on adaxial surface, tip not recurved. Ovules 2 per loculus
         4. Processes 2–5, white, *c.* 0.1 mm long. Leaves sessile or with a petiole < 0.1 mm long; lamina 0.6–4 mm long ..... **4. E. maidenii**
         4. Processes 4 or 5, reddish, 0.2–0.3 mm long. Leaves with a petiole 0.2–0.4 mm long; lamina 1–5 mm long ..... **5. E. patrickiae**
1. Stamens greater than 16
   5. Stamens prominently exserted (twice length of calyx lobes). Ovules 2 per loculus. Plants prostrate ..... **7. E. denticulata**
   5. Stamens not prominently exserted. Ovules 3–6 per loculus. Plants spreading to erect
      6. Stamens 16–23. Anthopodium 1.0–2.3 mm long ..... **1. E. leptospermoides**
      6. Stamens 25–29. Anthopodium less than 0.1 mm long ..... **2. E. inflata**

1. Euryomyrtus leptospermoides (C.A. Gardner) Trudgen, *comb. nov.*

Baeckea leptospermoides C.A. Gardner, *J. Roy. Soc. Western Australia* 27: 188 (1942), non *E. leptospermoides* F. Muell. ex Miq., *Ned. Kruidk. Arch.* 4: 149 (1856), *nom. nud. Type:* "Hab. in distr. Coolgardie prope Karalee, in fruticetis arenoso-glareosis, flor. m. Sept. Gardner" near Karalee, [Western Australia], 19 September, *C.A. Gardner s.n.* (*holo:* PERTH 01605593; *iso:* PERTH 01605607, 01605615, 01605623).

Open to compact, erect or sometimes spreading woody *shrub* usually with short branchlets from the main stems, 20–90 cm tall. *Leaves* half overlapping to densely packed and spreading or distant to just overlapping and appressed on rapidly growing stems; petiole 0.3–0.9 mm long; lamina oblong-elliptic, less commonly oblong to broadly oblong or oblong to narrowly obovate, not to slightly thickened, planar, plano-convex or shallowly concavo-convex, 1.5–4.5 mm long, 1.0–1.7 mm wide, obtuse, no distinct veins, oil glands below surface. *Flowers* 1–7 per branchlet on 1- or 2-noded brachyblasts; brachyblasts terminal and in the upper leaf axils; each peduncle subtended by a very reduced leaf *c.* 0.3 mm long or sometimes by a normal leaf; anthopodium 1.0–2.3 mm long; peduncle 0.8–2.5 mm long, terminated by a pair of sub-opposite to alternate bracteoles; bracteoles reniform to deltoid, concave, attachment broad, 1.0–1.4 mm long 1.3–1.8 mm wide, not thickened. *Hypanthium* hemispherical to semi-ellipsoid, 2.0–3.0 mm long, 3.4–5.0 mm diam., smooth, oil glands not obvious; calyx lobes erect to slightly spreading, transverse semi-elliptic to semi-circular to semi-elliptic or deltoid, 1.3–2.0 mm long, 1.3–1.8 mm wide, not keeled, minutely laciniate. *Corolla* 8.0–15.0 mm diam., white; petals spreading, sub-orbicular to orbicular or rarely very broadly ovate, claw very short. *Processes* 6–10, at base of adaxial side of petals, 0.4–0.6 mm long, reddish. *Stamens* 16–23, typically 20, then one opposite each petal, one opposite each calyx lobe and one between these, when more than 20 there are 2 opposite some calyx lobes, when less than 20 some calyx lobes have none opposite them and one or more intermediates missing. *Filaments* terete or very slightly flattened near the base, tapering towards apex, curved inwards at apex, antepetalous longest, equalling or just exceeding calyx lobes, 1.4–1.8 mm long, antesepalous shortest, 0.9–1.2 mm long. *Anthers* 0.5–0.6 mm long; connective gland obovoid, 0.2–0.3 mm diam. *Ovary* 3-locular, lower two-thirds fused to hypanthium, top equalling staminophore; placentas slightly raised elliptic areas on the floral axis, *c.* 0.4 mm long; ovules 3–5 per loculus. *Style* stout, fusiform, inserted into top of ovary, equalling antepetalous anthers. *Undehisced fruit:* hypanthium hemispheric, capsule not quite equalling calyx lobes. *Dehisced fruit:* capsule opening widely. *Seeds* very stoutly reniform, *c.* 1.7–1.8 mm long; aril very small (possibly absent in some specimens); testa minutely colliculate, straw-coloured, dull. (Figure 2A–C)

Selected specimens examined. WESTERN AUSTRALIA: Koorarawalyee, 40 miles [64 km] E of Southern Cross, *J.S. Beard* 3878 (PERTH); 12 miles [19 km] ENE of Merredin on Great Eastern Highway, *B.G. Briggs* 232, (NSW); 16.7 km from Moorine Rock towards Perth along Great Eastern Highway, *E.M. Canning* WA 68/2680 (CBG); 4 km S of Korbel, 32°42' S, 118°09' E, *R.J. Cranfield* 5287 (PERTH); along State vermin fence no. 7, 105 km SE of Southern Cross, 80 km S of Great Eastern Highway, 31°51' S, 120°01' E, *J. Dodd* 405 (PERTH); Merredin, *M. Koch* 2737 (MEL); Muntagin, *E.T. Bailey* 477 (PERTH); Karalee, *J.W. Green* 1699 (PERTH); Boodarding Rock, *c.* 37 km SE of Marvel Loch, *K.R. Newbey* 6045 (PERTH).

Distribution. Endemic to Western Australia, known only from Merredin to Koorarawalyee (east of Southern Cross) in a belt paralleling Great Eastern Highway. Most specimens are from along Great Eastern Highway but some are from south of the Highway. (Figure 1)

Habitat. Euryomyrtus leptospermoides grows in low vegetation including heaths, shrublands and thickets, sometimes with *Allocasuarina* or mallee *Eucalyptus* species on a variety of soils including yellow sand, yellow clayey sand and sandy clay.

Flowering period. Flowering recorded from August to November but mostly September and October.

Conservation status. CALM Conservation Code: Priority Three. This species is not widely distributed and is apparently uncommon, with three of the six specimens collected since 1980 coming from the same locality. However, it is probably not threatened as in the eastern part of its range clearing for

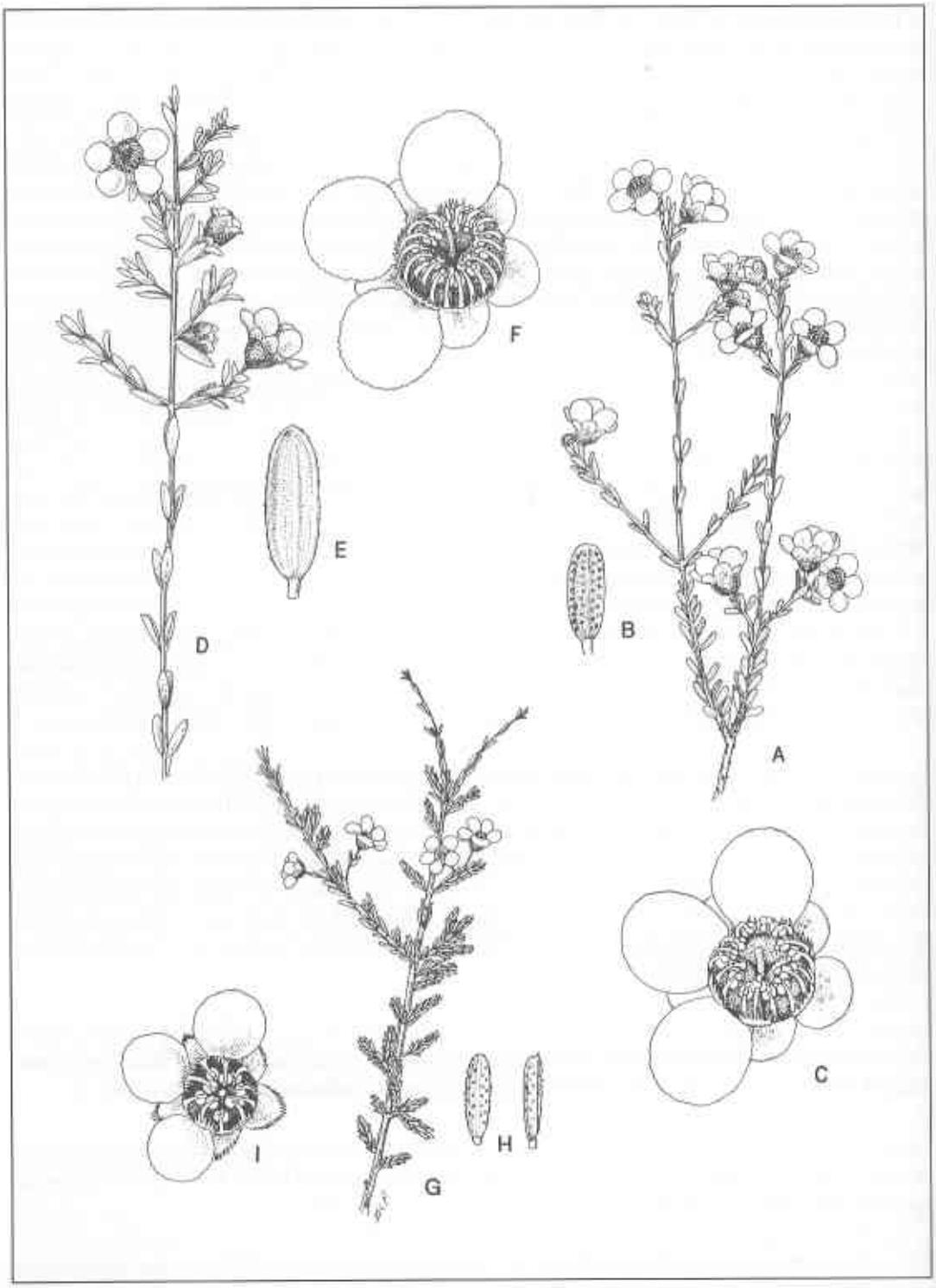

Figure 2. A–C. *Euryomyrtus leptospermoides*. A – flowering branch (x1), B – leaf (x4), C – flower with two petals removed (x4); D–F. *Euryomyrtus inflata*. D – flowering branch (x1), E – leaf (x4), F – flower with two petals removed (x4); G–I. *Euryomyrtus patrickiae*. G – flowering branch (x1), H – two views of leaf (x5), I – flower with two petals removed (x5). Drawn from *K.R. Newbey* 9659 (A–C), *M. Hislop* 437(D–F) and *E. Bennett & P. Ellery* GG029 (G–I).

agriculture is not extensive. One of the specimens seen is from Jilbadji Nature Reserve (Boodarding Rock). Surveying of the species to determine its exact status is desirable.

Notes. The seeds seen were not fully mature as the embryos were not fully developed. However the testa seemed to be reasonably mature (it is quite thick and has a columnar structure).

The staminophore is sinusoidal and this accentuates the difference in length of the antepetalous and antesepalous filaments as the latter occur in the troughs and the former on the crests.

The monads occur on 1- or 2-noded brachyblasts (short-shoots) with one to three monads present, each subtended by a reduced leaf (*c.* 0.3 mm long and not at all leaf-like) and there is a dormant shoot apex present. The brachyblasts usually occur at the end of branchlets (ie. terminally) but occasionally occur in the axils of the second pair of leaves from the branchlet apex. On some specimens the flowers are subtended by properly developed leaves rather than reduced ones.

No fully dehisced fruits were seen, but from the most mature fruits seen it appears likely that they would open quite widely. It is not clear from the material available whether or not the fruits are pendulous or held erect when dehiscing.

2. Euryomyrtus inflata Trudgen, *sp. nov.*

Fruticulus effusus 30–70 cm altus. Folia appressa vel leviter effusa, oblonga vel late elliptica, ovata, vel obovata, obtusa, 1.9–6.5 mm longa; petioli 0.3–0.6 mm longi. Flores 1 vel 2 per ramulos in brachyblastis 1-nodis terminalibus vel axillaribus orti; anthopodium < 0.1 mm longum; pedunculus c. 0.7 longus, per bracteolas duas subopposita terminatus. Hypanthium doliiforme 4.5–4.7 mm diam.; calycis lobi erecti vel leviter effusi. Corolla alba, 7.5–10.0 mm diam.; petala effusa vel leviter reflexa. Processi 10–12 ad basim petalorum lateris adaxialis affixi, c. 0.3 mm longi, albi. Stamina 25–29, uno in quoque petalo opposito ceterum bini ternique aggregati inter petala atque calycis lobos et calycis lobos oppositos; filamenta teretia, angustata, incurva; filamenta antepetala calycis lobis leviter excedentia; antherae dorsifixae, versatiles. Ovarium 3- vel 4-loculare. Stylus gracilis fusiformis. Placenta convexa elliptica in axe florali affixa; ovula 3–6 per loculum. Fructus ante dehiscentem: hypanthium sursum expansum, doliiforme, sub calycis lobis contractum, induratum (nec lignosum), pallido brunneum; capsula staminophorum aequans. Fructus post dehiscentem erectus, capsula haud late aperiens. Semina reniformia, c. 1.7–1.8 mm longa; arillus parvus; testa colliculata, straminea vel pallido brunnea.

Typus: 4.7 km along road to Wiluna from the Meekatharra to Leonora road, Western Australia, 1 June 1982, *M.E. Trudgen* 2943 *& M.I. Blackwell* (*holo:* PERTH 01637096; *iso:* AD, CANB, K, MEL, NSW, PERTH 01637118).

Spreading woody *shrub* with numerous stems from the ground and short branchlets from them, 30–70 cm tall. *Leaves* distant, half overlapping, appressed to slightly spreading; petiole 0.3–0.6 mm long; lamina straight or slightly recurved, oblong to broadly elliptic to ovate or obovate, not to slightly thickened, planar or shallowly concavo-convex, 1.9–6.5 mm long, 1.6–2.2 mm wide, obtuse, veins visible on abaxial surface when leaves not thickened, dull green or grey-green on different individuals in the same population. *Flowers* 1 or 2 per branchlet on a 1-noded terminal brachyblast, or rarely the brachyblasts are in the upper leaf axils, each peduncle subtended by a very reduced leaf *c.* 0.3 mm long; anthopodium < 0.1 mm long; peduncle *c.* 0.7 mm long, terminated by a pair of sub-opposite bracteoles which clasp the base of the hypanthium; bracteoles very broadly cordate, very concave, attachment

broad, 1.2–1.5 mm long 2.0–2.2 mm wide, thin. *Hypanthium* barrel-shaped, 4.0–4.5 mm long, 4.5–4.7 mm diam., the base hemispheric, smooth, oil glands not obvious; calyx lobes erect to slightly spreading, transversely semi-elliptic to semi-circular 1.0–1.5 mm long, 2.5–3.0 mm wide, slightly keeled, minutely laciniate. *Corolla* 7.5–10 mm diam., white; petals spreading to slightly reflexed, broadly ovate, broadly oblong-elliptic, oblong or sub-orbicular, 3.5–3.7 mm long, 3.0–3.5 mm wide, claw very short or absent. *Processes* 10–12, at base of adaxial side of petals, *c.* 0.3 mm long, white. *Stamens* 25–29, one opposite each petal, the others in groups of two or three between the petals and the centres of the calyx lobes the remainder opposite the centres of the calyx lobes with one or more missing (0–4 antesepalous stamens present). *Filaments* terete or very slightly flattened near the base, tapering towards and curved inwards at apex, antepetalous longest, just exceeding calyx lobes, 1.5–1.7 mm long, antesepalous shortest, 0.7–0.8 mm long. *Anthers* 0.5–0.7 mm long, *c.* 0.5 mm wide; connective gland cylindrical, *c.* 0.2 mm long, *c.* 0.1 mm diam. *Ovary* 3- or 4-locular, half length of hypanthium, lower 3/4 fused to hypanthium; placentas slightly raised elliptic areas on the floral axis, *c.* 0.3 mm long; ovules 3–6 per loculus (usually 6), tending towards circular in arrangement (rather than in rows). *Style* slender, fusiform, inserted into top of ovary, equalling calyx lobes. *Undehisced fruit:* hypanthium expanded outwards, barrel-shaped, contracted under calyx-lobes, indurated but not woody, tan-coloured; capsule equalling staminophore. *Dehisced fruit:* erect, capsule not opening very widely. *Seeds* reniform, *c.* 1.7–1.8 mm long; arill small; testa colliculate, straw-coloured to light brown. (Figure 2D–F)

Specimens examined. WESTERN AUSTRALIA: 32 miles [52 km] S of Wiluna on road to Sandstone, *A.S. George* 5628 (PERTH, MEL); 70 miles [113 km] N of Sandstone on road to Wiluna, *A.S. George* 5654 (AD, PERTH); 4.7 km along road to Wiluna from the Meekatharra to Leonora road (type locality), *M.E. Trudgen* 2944 (PERTH).

Distribution. Known only from three localities on the Sandstone to Wiluna road, north of the intersection with the Meekatharra to Leonora road, Western Australia. (Figure 1)

Habitat. At the type locality *E. inflata* grows in a *Triodia/Aluta maisonneuvii* hummock grassland/ low open shrubland with scattered emergent *Acacia* and *Hakea* on deep red sand. Similar vegetation and soil data are given with other collections.

Flowering period. Flowering collections have only been made in June and July, but this probably reflects the paucity of collections made for this species.

Conservation status. CALM Conservation Code: Priority One. *E. inflata* must be considered as needing investigation as it is only known from four collections (two of which are from the same locality) and may be a quite uncommon species. However, it occurs in an area that is not very well collected.

Etymology. The specific epithet refers to the inflated hypanthium in the fruit.

Notes. The leaves and the size and general appearance of the flowers of *Euryomyrtus* inflata indicate that it is quite closely related to *Euryomyrtus leptospermoides*, certainly closer than any other species is to either. It seems probable that they are the result of divergence between two isolated populations of a common ancestor and that this seperation is relatively recent. The most striking difference between the two is the expansion of the hypanthium in the fruit of *Euryomyrtus leptospermoides*, with other morphological differences being essentially of a quantitative rather than a qualitative nature. This expansion of the hypanthium is unique in the genus and gives the fruit a quite different appearance to that of the other species, particularly as the staminophore does not expand so that the fruit is

it occupies a quite different ecological niche occurring on red sand plains with *Triodia*, rather than in heathlands or shrublands. It is also unusual in that the fruit is held erect when dehiscing rather than becoming pendent.

The branchlets give the impression that the leaves on each are all from one seasonal growth unit. If this is so then simply dropping its leaves during summer may be a strategy for coping with the long summer drought that occurs in the area where *E. inflata* grows.

3. Euryomyrtus recurva Trudgen, *sp. nov.*

Fruticulus ad 70 cm altus; caules graciles ramulis brevibus gerentibus. Folia appressa vel effusa, linearia, arcte involuta (pagina adaxioli ut videtur canaliculata), incrassata, infra convexa (semi-circularia), 1.7–4.0 mm longa, apice recuro acuto; petioli 0.1–0.2 mm longi. Flores 1–3 per ramulus in brachyblastis axillaribus vel terminalibus orti; anthopodium1.0–1.7 mm longum; pedunculus 0.6-1.5 mm longus per bracteolas duas suboppositas terminatus. Hypanthium obconicum c. 2.0 mm diam.; calycis lobi erecti vel leviter effus. Corolla rosea 4.5–6.5 mm diam; petala effusa. Processi 2–4 ad basim petalorum lateris adaxialis affixi, c. 0.3 mm longi, albi. Stamina 10 petalis et calycis lobis opposita; fiamenta teretia angustata incurva; filamenta antepetala calycis lobis aequans vel leviter excedentia; antherae dorsifixae, versatiles. Ovarium 3-loculare. Stylus cylindricus. Placenta convexa elliptica in axe florali affixa; ovula 3–5 per loculum. Fructus antedehiscentem: hypanthium hemisphaericum; capsula calycis lobis aequans vel leviter excedens. Fructus post dehiscentem: capsula late aperiens. Semina reniformia, c. 2.2 mm longa; arillus bene evolutus; testa colliculata, pallido brunnea, nitida.

Typus: 5 miles [8 km] north-east of Wubin on Great Northern Highway, Western Australia, *A.S. George* 5675 (*holo:* PERTH 01637126; *iso:* AD, CANB, MEL, NSW).

Shrub to 70 cm tall, with slender woody stems bearing short leafy branchlets. *Leaves* to 2/3 overlapping and spreading or distant and appressed on rapidly growing stems; petiole 0.1–0.2 mm long; lamina linear, tightly involute (appearing 2-channelled on adaxial surface), thickened, convex (semi-circular) below 1.7–4.0 mm long, 0.4–0.6 mm wide, smooth, oil glands visible below surface, tip recurved, pointed. *Flowers* usually 1–3 (rarely to 11) per branchlet, inflorescences axillary (usually in the axils of the upper leaves) or terminal brachyblasts of 1 or 2(4) flowers; each peduncle subtended by a very reduced bract-like leaf *c.* 0.3 mm long or sometimes by a more normal leaf *c.* 1.0 mm long; anthopodium 1.0–1.2.3 mm long; peduncle 0.6–2.5 mm long, terminated by a pair of sub-opposite bracteoles; bracteoles very broadly cymbiform, 0.6–0.9 mm long *c.* 0.9 mm wide, not thickened, attachment broad, margins white, minutely laciniate. *Hypanthium* obconic, *c.* 1.3 mm long, *c.* 2.0 mm diam., smooth, oil glands not obvious; calyx lobes erect to slightly spreading, semi-circular to semi-elliptic or deltoid, 0.9–1.3 mm long, 1.0–1.4 mm wide, very slightly keeled, margin white, ragged to laciniate. *Corolla* 4.5–6.5 mm diam., pink; petals spreading, sub-orbicular to transversely elliptic or squarish, claw very short. *Processes* 2–4, at base of adaxial side of petals, *c.* 0.3 mm long, white. *Stamens* 10, one opposite each petal and each calyx lobe. *Filaments* terete, tapering towards apex, curved inwards at apex, antepetalous longest, equalling or just exceeding calyx lobes, 0.8–1.0 mm long, antesepalous 0.6–0.8 mm long. *Anthers c.* 0.5 mm long; connective gland globular, 0.1–2 mm diam. *Ovary* 3-locular, lower half fused to hypanthium, top almost equalling staminophore; placentas slightly raised elliptic areas on the floral axis, *c.* 0.2 mm long; ovules 3–5 per loculus, collateral. *Style* cylindrical, inserted into top of ovary, equalling or just exceeding antepetalous anthers. *Undehisced fruit:* hypanthium hemispherical, capsule equalling or just exceeding the calyx lobes, which form a persistent rim on the hypanthium. *Dehisced fruit:* capsule opening very widely. *Seeds* reniform, *c.* 2.2 mm long; aril well developed; testa colliculate, light brown, shiny. (Figure 3A–E)

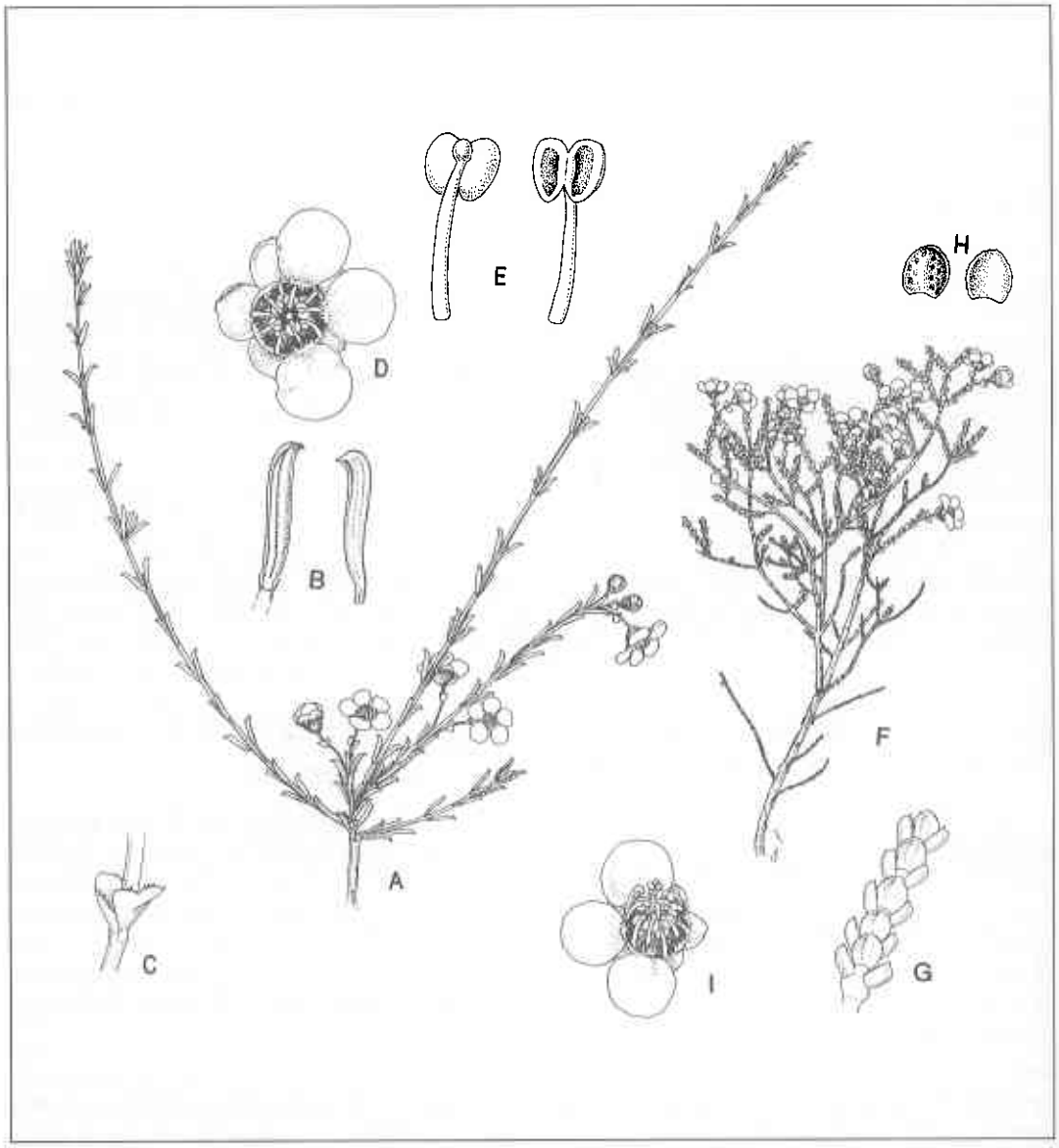

Figure 3. A–E. *Euryomyrtus recurva*. A – flowering branch (x1), B – two views of leaf (x5), C – bracteoles (x10), D – flower with two petals removed (x5), E – two views of stamen (x20); F–I. *Euryomyrtus maidenii*. F – flowering branch (x1), G – branchlet (x8), H – two views of leaf (x8), I – flower with two petals removed (x4).

Specimens examined. WESTERN AUSTRALIA: W of Youanmi, *T.E.H. Aplin* 6102 (AD, PERTH); Wanarra, near Lake Monger, *C.A. Gardner* 12499 (PERTH, KEW); Wanarie Station (formerly Wandary Station) next to Merroe Siding, *A.L. Payne* 1038 (MEL, PERTH); Lake Moore, *A. Robinson* 31, 54, 129 and 143 (PERTH).

Distribution. Known only from between Wubin, Youanmi and Lake Austin, Western Australia. (Figure 1)

Habitat. The type was found in *Acacia* tall shrubland on red loam and the *A.L. Payne* 1038 specimen was found in red sand over laterite (Kali land system).

Flowering period. Flowering recorded from June to September.

Conservation status. CALM Conservation Code: Priority Three. *E. recurva* must be considered as needing investigation as it is only known from five localities from a fairly restricted area. Searches (by myself) of a restricted nature in two of the localities known, and surrounding areas, have failed to relocate the species. However it is probably not threatened as it occurs in a poorly collected region where there has not been widespread clearing for agriculture.

Etymology. The specific epithet refers to the recurved tips of the leaves, which are unique in the genus.

Notes. While the testa is definitely crustaceous it is fairly thin and does not have the thick, columnar structure of the testa of *E. leptospermoides* seeds. In the fruit observed only one of the two ovules in a loculus developed.

The inflorescences are interpreted as brachyblasts as in both the terminal and axillary situation the peduncles are subtended by bracts that are positioned at right angles to the upper leaf pair in the terminal situation and the subtending leaf in the axillary situation. Occasionally, the shoot apex between the peduncles grows on while flowering is in progress giving the appearance of axillary monads, but closer inspection shows that the peduncles are subtended by bracts positioned at right angles to the closest leaves. Rarely, an extra bracteole is developed under the hypanthium, whether this is simply an aberration or indicates a reduction from a metaxymonad to a monad in the more general situation described above is unclear; on the specimen where this was observed the anthopodium was 0.4 mm long and the intermediate axis 1.3 mm long.

The species is only known from eight specimens so it is likely that the measurements recorded for different structures in the description above will be exceeded when more specimens are collected.

4. Euryomyrtus maidenii (Ewart & Jean White) Trudgen, *comb. nov.*

Baeckea maidenii Ewart & Jean White, *J. Roy. Soc. New South Wales* 45: 184 (1909). *Type:* Cowcowing, Western Australia, *M. Koch* 1021 (*holo:* NSW; *iso:* MEL).

Open to dense, woody *shrub* with numerous, densely leaved, small branchlets, speading or erect, 10–60 cm tall. *Leaves* quadrifarious, 1/4–2/3 overlapping and slightly spreading, or distant to just overlapping and appressed on quick growing shoots; petiole absent (lamina attachment broad) or < 0.1 mm long; lamina very variable in shape, narrowly to broadly elliptic, oblong, linear or sub-orbicular, plano-convex or concavo-convex, not much thickened to (usually when concavo-convex) semi-terete or thicker (when plano-convex), 0.6–3.9 mm long, 0.2–1.1 mm wide, acute to very obtuse, abaxial surface very smooth, or with three longitudinal, slightly raised veins and the tip keeled, or rarely with raised oil glands. *Flowers* 1–5 on a branchlet, solitary in the upper leaf axils, often with 1 or 2 in axils of last pair of leaves; anthopodium 0.7–1.7 mm long; peduncle 0.5–1.1 mm long, terminated by a pair of bracteoles; bracteoles ovate to broadly ovate or deltoid, acute to acuminate, concave, not thickened, 0.8–1.5 mm long, bases overlapping. *Hypanthium* semi-ellipsoid to obconic, 1.0–1.6 mm long, 1.6–2.1 mm diam., smooth, top reddish, bottom green; calyx lobes erect, transversely semi-elliptic, semi-elliptic or deltoid, thin, not keeled, 0.8–1.0 mm long, margins very thin, white, shortly lacerated, centre brown-maroon. *Corolla* 4.0–7.5 mm diam., white, mauve or various shades of pink;

petals spreading, sub-orbicular to broadly ovate, shortly clawed, 2–3 mm long. *Stamens* 10, one opposite each calyx lobe and petal, antepetalous longer, not quite equalling to markedly exceeding calyx lobes. *Filaments* terete, tapering from the base, tip incurved, antepetalous 0.9–1.7 mm long. *Anthers* 0.3–0.4 mm long; connective gland sub-globular or slightly curved, *c.* 0.1 mm diam. *Processes* 2–5, between petals and antepetalous filaments, *c.* 0.1 mm long, white. *Ovary* 3-locular, top equalling staminophore, lower half fused to hypanthium; placentas raised broadly oblong areas on floral axis, *c.* 0.3 mm long by 0.2 mm wide; ovules 2 per loculus, collateral, 0.5 mm long. *Style* slender, fusiform, inserted deeply into ovary, equalling calyx lobes, or where stamens markedly exceeding calyx lobes slightly exceeding stamens. *Undehisced fruit:* hypanthium thin, hemispheric, upper part of ovary expanded to equal or slightly exceed calyx lobes. *Dehisced fruit*: capsule opening widely, valves obtuse, hypanthium becoming saucer-shaped. *Seeds* reniform, 1.7–1.8 mm long; aril present; testa thin, light brown, shiny, colliculate. (Figure 3F–I)

Selected specimens examined. WESTERN AUSTRALIA: W of Bullabulling, which is *c.* 65 km SW of Kalgoorlie, *A.M. Ashbey* 2509 (B, L, LE, NCU, PERTH, SA, UC, W); 10.4 miles [16.7 km] from Moorine Rock towards Perth along Great Eastern Highway, 10 Sep. 1968, *E.M. Canning* (CBG); base of water tank, 12 km E of Ghooli, *R.J. Cranfield* 1513 (AD, NSW, PERTH); 26 km due S of Bodallin, *R.J. Cranfield* 2306 (PERTH); Youndegin, 1892, *Miss Alice Eaton* (MEL); 287 mile post on Paynes Find to Mount Magnet road (Great Northern Highway), *A.R. Fairall* 1802 (KINGS PARK, PERTH); Bronti, *C.A. Gardner* 12187 (BRI, K, PERTH); 20 miles [32.2 km] E of Cundeelee, 9 Mar. 1963, *M.C. George*, (PERTH); Coolgardie, July 1899, *R. Helms* (PERTH); Yilgarn, near Mt Moore, 1889, *H.S. King & De Courcy Lefroy* (MEL); 13 km S of Mt Glass, Bremer Range, *K. Newbey* 5391 (MEL, PERTH); 6 miles [10 km] W of Broad Arrow, *B.L. Powell* 74018 (PERTH); 3 miles [4.8 km] W of Crampthorne, S of Muntadgin, *R.D. Royce* 7877 (CBG, PERTH); 6.5 km N of Hickey Ricken Soak (N of Bullfinch), *R.A. Saffrey* 954 (CANB, MEL, PERTH); northern boundary gate of Lake Barlee Station with Youanmerry & Youangarra Stations, *R.A. Saffrey* 1004 (PERTH); between Salmon Gums and Lake King, 39.2 km W of the turnoff to Peak Charles, *M.E. Trudgen* 1712 (AD, CBG, K, MEL, NSW, PERTH).

Distribution. The species is restricted to the south-west of Western Australia with most collection records from a belt parallelling Great Eastern Highway from Cunderdin in the west to near Cundeelee in the east. However, the species extends north to the Paynes Find–Lake Barlee area and south to the Bremer Range area (east of Lake King). (Figure 1)

Habitat. Over its range *E. maidenii* is found in a variety of vegetation types on a variety of soils. In the north of its range it grows with *Triodia* (Spinifex) on red and yellow sands. In the centre of its range it grows in a range of heath, shrubland and scrub types (including some with mallee *Eucalyptus* species), mostly on yellow sands. In the southern part of of its range it grows in heaths and open *Eucalyptus* woodlands on white sands, clayey white sands and lateritic soils.

Flowering period. Flowering has been recorded from March to October, with a peak in August/ September and only one record each for March and April.

Chromosome number. n = 11 (Rye 1979).

Conservation status. This is the most widespread of the Western Australian species referred to *Euryomyrtus* and although many populations in the wheatbelt part of its distribution must have been lost through clearing for agriculture it appears to be fairly secure.

Notes. The flowers in the axils of two opposite leaves may be at quite different stages, for example one may be at anthesis while the other is in fruit.

This widespread species is quite variable and close study may show that some of this variation is worthy of subspecific recognition.

5. Euryomyrtus patrickiae Trudgen, *sp. nov.*

Euryomyrto maidenii affinis sed foliis petiolaris et processibus longioribus rubellis ad basim petalorum affixis differt.

Typus: Great Northern Highway, 41.7 km north of Paynes Find, Western Australia, 16 July 1996, *S. Patrick* 2679 (*holo:* PERTH 05512689; *iso:* CANB, MEL).

Open, spreading, divaricately branched woody *shrub* with short branchlets from the stems, to 1 m tall and 1 m across. *Leaves* distant and appressed on some older or quickly elongating branchlets to densely packed and slightly spreading on shorter, younger branchlets; petiole 0.2–0.4 mm long, subtended at each side by a very small, hair-like stipule; lamina narrowly obovate, sometimes elliptic or rarely ovate on atypically short leaves, slightly to moderately thickened, the adaxial surface flat to shallowly concave, the abaxial surface shallowly convex to almost semicircular but the sides then somewhat flattened, 1–5 mm long, 0.4–1 mm wide, obtuse, the adaxial surface with no veins or oil glands, the abaxial surface with oil glands in 4 irregular rows separated by the midrib and two veins parallel to it, these 3 veins indistinct to slightly raised, the midrib generally more distinct than the others and sometimes fairly prominent, becoming keel-like at the apex and rarely having a small point; the margins with short, irregular outgrowths of the cuticle. *Flowers* 1–4(9) on a branchlet; inflorescences of solitary monads in axils of normal leaves, either near the middle of the short lateral branchlets or near the base of the elongate branchlets (sometimes also with a pair (or more) near the top of the elongated shoots); anthopodium 1.3–2.8 mm long; peduncle 0.3–1.6 mm long, terminated by a pair of sub-opposite bracteoles, rarely also a single bracteole part way up the anthopodium at right angles to the pair terminating the peduncle; bracteoles semi-elliptic, auriculate, with a broad attachment, concave (especially on dried material), 1.0–1.5 mm long, 1.0–1.1 mm wide, not thickened, midrib prominent on abaxial side, almost entire to irregularly shortly lacerated. *Hypanthium* obconic to hemispherical, 1–1.4 mm long, 2.4–2.8 mm diam., smooth, oil glands not obvious; calyx lobes erect or slightly spreading, broadly deltoid to (less often) transversely semi-elliptic or semi-elliptic, 0.9–1.5 mm long, 1.4–1.6 mm wide, centre herbaceous (green or sometimes reddish) with a narrow to broad white, petaline border, margin entire to laciniate. *Corolla* light pink, *c.* 6.5 mm diam.; petals spreading, sub-orbicular to very broadly ovate, claw short. *Processes* 4 or 5, at base of adaxial side of petals, 0.2–0.3 mm long, reddish. *Stamens* 10, one opposite each petal and calyx lobe. *Filaments* terete or very slightly flattened near the base, tapering towards and curved inwards the apex, antepetalous longest, exceeding calyx lobes and style, 0.8–1.0 mm long, antesepalous shortest, 0.4–0.6 mm long. *Anthers* 0.3–0.4 mm long; connective gland cylindrical, 0.2–0.3 mm long. *Ovary* 3-locular, sides and base fused to the hypanthium, top slightly convex, not equalling staminophore; placentas raised elliptic areas *c.* 0.2 mm long on the floral axis, deeply divided along the centre; ovules 2 per loculus, collateral *c.* 0.4 mm long. *Style* cylindrical, inserted into top of ovary, exceeding calyx lobes, not quite equalling antepetalous anthers. *Undehisced fruit*: hypanthium hemispherical, capsule expanded at top to equal calyx lobes. Immature seeds reniform, *c.* 1.5 mm long; aril well developed; testa minutely colliculate.

Selected specimens examined. WESTERN AUSTRALIA: Burnerbinmah Station, NW of Paynes Find, Nangel Paddock, 500 m N of Wadda Wadda Well, 29 Mar. 1997, *S. Patrick s.n.* (PERTH); Burnerbinmah Station, NW of Paynes Find, Nangel Paddock, 500 m N of Wadda Wadda Well, 29 Mar. 1997, *S. Patrick et al.* 106 (PERTH); Burnerbinmah Station, NW of Paynes Find, E boundary of Nangel Paddock, 20.2 km W of homestead, 29 Mar. 1997, *S. Patrick et al. 104* (PERTH); 14.7 km E of Windsor Station

Homestead and 30.9 km W of turnoff to Paynes Find at Sandstone, 14 Sep. 1996, *S. Patrick* 2807A (PERTH); Youanmi Downs, 22 Sep. 1993, *H. Pringle* 3941 (PERTH); Gossan Hill, S of Yalgoo, 10 July 1999, *J.M. Ward s.n.* (PERTH).

Distribution. Endemic to Western Australia, known from south of Yalgoo to west of Sandstone in the Austin Botanical District. (Figure 1x)

Habitat. Euryomyrtus patrickiae has been collected from a plain with red sandy soil and open scrub of *Acacia* over "spinifex" and low sedges and from the slopes of a hill with brown loamy, rocky soil with *Acacia aneura* var. *aneura* low open woodland over shrubs including *Dodonaea petiolaris*, *Mirbelia* aff. *depressa* and *Erisotemon sericeus*.

Flowering period. Flowering collections have been made in March, July, September and October.

Conservation status. CALM Conservation Code: Priority Three. This species is only known from a relatively small area and several of the specimens come from one small part of Burnerbinmah Station. However, Burnerbinmah Station is owned by the Department of Conservation and Land Management and is managed for conservation and research purposes (S. Patrick pers comm.). Therefore, *Euryomyrtus patrickii* is probably not threatened, but further survey work is needed to confirm its conservation status.

Etymology. The specific epithet acknowledges the work of Sue Patrick (Western Australian Herbarium), who collected the type and several of the other specimens of *Euryomyrtus patrickiae* in the process extending the known range of the species. Sue has also made many other collections of small-flowered Myrtaceae, which have assisted research into the taxonomy of these plants, as well as furthering her work on flora of conservation significance.

Notes. Euryomyrtus patrickiae was previously referred to by the informal geographic name *Euryomyrtus* sp. Golden Grove (*S. Patrick* 2679).

No brachyblasts (short-shoots) were observed, all inflorescences being axillary monads. As in some other species, the staminophore is sinusoidal and this accentuates the difference in length of the antepetalous and antesepalous filaments as the latter occur in the troughs and the former on the crests.

The seeds seen were not mature as the embryo was not developed, however the shape was definitely reniform, the testa was quite thick and had developed a colliculate surface and the aril was about half the length of the seed. The hilum is fairly small, about a fifth of the length of the immature seeds (possibly less when they are mature).

6. Euryomyrtus ramosissima (A. Cunn.) Trudgen, *comb. nov.*

Synonyms and illustrations. See under the two subspecies.

Shrub, erect to spreading to procumbent to prostrate, diffuse to dense, woody or rarely lax, usually with short branchlets from the main stems, 5–60 cm tall, glabrous except for leaves. *Leaves* half overlapping to densely packed and spreading or distant to just overlapping and appressed on rapidly growing stems, petiolate; lamina linear to linear-lanceolate or ovate-lanceolate to spathulate, not to slightly thickened, flat or shallowly concavo-convex, 2–14 mm long, 0.7–3.0 mm wide, acuminate to

rounded, with no distinct veins, dotted with oil glands, margins and less often lamina scabrous (trichomes sub-conic, short, hard, translucent), margins sometimes recurved; petiole 0.2–1.0 mm long; lamina discolorous when margins recurved. *Flowers* 1–16 per branchlet on 1- or 2-noded terminal and axillary brachyblasts bearing 1–4 monads; peduncles subtended by a very reduced leaf *c.* 0.3 mm long or sometimes by a normal leaf, 1.0–9.0 mm long, terminated by a pair of sub-opposite to alternate bracteoles; anthopodium 1.0–7.0 mm long; bracteoles cordate to rhomboid, very concave, attachment broad, 0.6–2.0 mm long, not thickened, margins ciliolate to erose-ciliolate. *Hypanthium* obconic to broadly obconic, 2.0–3.0 mm diam., smooth, oil glands not very obvious; calyx lobes erect to slightly spreading, transversely semi-elliptic to semi-circular to semi-elliptic or deltoid, 0.9–1.8 mm long, 1.3–1.8 mm wide, not keeled, centres reddish, margins ciliolate to erose-ciliolate. *Corolla* 3.0–15.0 mm diam., pure white, white tinged with red to brilliant pink or mauve-purple; petals spreading, sub-orbicular to orbicular or very broadly ovate to almost oblong, claw very short. *Processes* 5–15 at base of adaxial side of petals, 0.2–0.9 mm long, reddish. *Stamens* 3–10, one opposite each petal and one opposite each calyx lobe when 10, when less than 10 those opposite the petals predominant. *Filaments* sub-terete to very slightly flattened (rarely quite flattened), tapering towards apex, antepetalous longest, equalling or just exceeding calyx lobes, 0.5–1.8 mm long. *Anthers* 0.3–0.75 mm long; connective gland obovoid, 0.2–0.3 mm diam. *Ovary* 3-locular, lower 3/4 fused to hypanthium, top slightly exceeding staminophore; placentas elliptic, *c.* 0.3–0.4 mm long, broadly attached at centres; ovules 3–5 per loculus. *Style* stout, sub-cylindrical, deeply inserted into top of ovary, equalling antepetalous anthers or rarely markedly exceeding them. *Undehisced fruit:* hypanthium hemispherical, capsule globular, just to 1/3 exceeding calyx lobes. *Dehisced fruit*: capsule opening very widely. *Seeds* reniform, 1.3–1.6 mm long; aril present; testa colliculate, chestnut brown, dull.

Distribution. See beneath the subspecies, below.

Notes. This species has been intensively studied by Carr (1980), who recognized two subspecies, but also noted some specimens intermediate between them and three variants within subsp. *ramosissima*. His concepts are followed here and the key and descriptions below are based on his work, which should be consulted for further details of variation and extensive specimen citations. Carr also provided a distribution map of the subspecies and intermediates, an account of the nomenclatural history of the species complex and observations on insects visiting the flowers.

Carr described the bracteoles as connate, but while they do overlap each other they are not fused and so the term is inappropriate. He also erred in considering that the closest relatives of *E. ramosissima* to be *B. crassifolia* and *B. ericaea*, as while these species are related, the closest relative is *E. denticulata*, followed by the other members of the genus *Euryomyrtus*.

Noting that the flowers of both subspecies were protandrous, Carr (1980) stated that "after the anthers dehisce the style elongates bringing the capitate stigma to the level of the anthers opposite the petals where it matures". However, some specimens have the style markedly exceeding the antepetalous stamens. Carr also noted that the seeds "are not actively dispersed but drop freely from the inverted capsules". However, the seeds are arillate and the aril may be attractive to ants, which may then distribute the seeds.

Some specimens have an extra bracteole on some flowers, either below (and at right angles to) the usual sub-opposite/alternate pair or above them near the base of the hypanthium.

Key to subspecies of *Euryomyrtus ramosissima*

1. Flowers erect, corolla (5)7–10(15) mm diam., petals white or mauve-purple. Floral trichomes 2–15, always present. Stamens 10 or rarely fewer ..... subsp. **ramosissima**

1. Flowers nodding, corolla 3–5 mm diam., petals white, ± tinged with red above or below. Floral trichomes few or absent. Stamens (3)5–10 ..... subsp. **prostrata**

6a. Euryomyrtus ramosissima (A. Cunn.) Trudgen subsp. **ramosissima**

Baeckea ramosissima A. Cunn. *in* B. Field, Geog. Mem. New South Wales: 349 (1825). *Type:* Blue Mountains, New South Wales, *Cunningham* 1822 (*holo:* K, *n.v.*).

Baeckea diffusa Sieber ex DC., Prodr. 3: 320 (1828). – *Euryomyrtus diffusa* (Sieber ex DC.) Schauer, *Linnaea* 17: 239 (1843). *Type:* Nova Hollandia (Port Jackson area), [New South Wales], *F.W. Sieber* (G-DC, *n.v.*).

Baeckea diffusa var. *striata* DC., Prodr. 3: 320 (1828). *Type:* Nova Hollandia (Port Jackson area), [New South Wales], *F.W. Sieber* (G-DC, *n.v.*).

Baeckea alpina Lindl. *in* T.L. Mitch., Three Exped. E. Australia 2: 178 (1838). – *Euryomyrtus alpina* (Lindl.) Schauer, *Linnaea* 17: 239 (1843). *Type:* Mt William, Grampians, [Victoria], 1836, *T.L. Mitchell* (*holo:* CGE, *n.v.*; *iso:* K, *n.v.*).

Baeckea thymifolia Hook.f. *in* Hook., *Icon. Pl.* 3 (2): t. 284 (1840). – *Euryomyrtus thymifolia* (Hook.f.) Schauer, *Linnaea* 17: 239 (1843). *Type:* South Esk River, Tasmania, *R.C. Gunn* 86 (*lecto:* K, *n.v.*, *fide* Carr (1980)).

Baeckea affinis Hook.f. *in* Hook., *Icon. Pl.* 3 (2): t. 284 (1840). *Type:* Elizabeth River, Campbell Town, Tasmania, *R.C. Gunn* 683 (*holo:* K, *n.v.*).

Euryomyrtus stuartina F. Muell. ex Miq., *Ned. Kruidk. Arch.* 4: 149 (1856). *Type:* "Ad fl. South Esk River", Tasmania, *F. Mueller* (*holo:* L, *n.v.*; *iso:* MEL).

Euryomyrtus leptospermoides F. Muell. ex Miq., *Ned. Kruidk. Arch.* 4:149 (1856), *nom. nud.*

Illustration. Carr (1980: Figure 2).

Rigid, erect to prostrate or procumbent *shrub* 5–60 cm high, sparsely branched to densely matted. *Leaves* linear-lanceolate to ovate-lanceolate or spathulate, 2–13 mm long, 1.0–3.0 mm wide, acute to obtuse, coriaceous. *Inflorescences* solitary or rarely paired, erect at anthesis, later deflexed. *Petals* 2.0–4.5 mm wide. *Ovules* usually 5 per loculus. *Capsule* 4–4.5 mm diam.; seeds 3 or 4 per loculus.

Selected specimens examined. NEW SOUTH WALES: Royal National Park, *c.* 2 km W of Bundeena, *G.W. Carr* 7042, 7048 (AD, CANB, LTB, NSW).
SOUTH AUSTRALIA: near Mt Jagged telephone exchange on the Adelaide to Victor Harbour road, *G.W. Carr* 7062–7064 (AD, CANB, LTB, NSW).
TASMANIA: South Esk River, Launceston, *Gunn* 89 (NSW).

VICTORIA: Three Jacks Wildflower Reserve near Stawell, *G.W. Carr* 7094–7108 (AD, CANB, LTB, NSW).

Distribution. From Coffs Harbour to near Sydney, New South Wales; on the western part of Kangaroo Island and the Fleurieu Peninsula South Australia; in the eastern part of Tasmania from coastal and inland localities; mostly in inland localities in Victoria, but not the far east or west, coastal in the far south west at Frankston and near Mt Richmond.

Habitat. "... occurs from 30° 18' to 43° 23' S of latitude, from sea level to 1930 m, in forest woodland or heath in acidic often infertile soils derived from sandstone, shale, granite or dolerite, and in localities between which the range in mean annual rainfall is 500–1900 mm" (Carr 1980).

6b. Euryomyrtus ramosissima subsp. **prostrata** (Hook.f.) Trudgen, *comb. nov.*

Baeckea prostrata Hook.f. *in* Hook., *Icon. Pl.* 3 (2): t. 284 (1840). – *Baeckea ramosissima* subsp. *prostrata* (Hook.f.) G.W. Carr, *Telopea* 1(6):416 (1980). *Type:* Circular Head, Tasmania, *R.C. Gunn* 816 (*holo:* K, *n.v.*).

Euryomyrtus parviflora F. Muell. ex Miq., *Ned. Kruidk. Arch.* 4: 149 (1856). *Type:* Georgetown, Tasmania, *C. Stuart s.n.* (*holo:* L, *n.v.*; *iso:* MEL).

Illustration. Carr (1980: Figure 1).

Procumbent or prostrate *shrubs* 8–20 cm high, erect when young, branches slender, rigid or lax, usually sparsely branched. *Leaves* linear to linear-lanceolate, 3–10 mm long, 0.7–1.5 mm wide, acute or acuminate, chartaceous. *Inflorescences* sparser than in subsp. *ramosissima*, solitary, deflexed at anthesis. *Petals* 1.0–2.5 mm wide. *Ovules* usually 4 per loculus. *Capsule* 3–4 mm diam.; seeds 2 or 3 per loculus.

Selected specimens examined. NEW SOUTH WALES: Nadgee Nature Reserve, 2.2 km N of Littlle River estuary, *Cameron* 4785 (LTB, NSW).
TASMANIA: Little Badger Head, Asbestos Range, 57 km NW of Launceston, *G.W. Carr* 6646, 6647, 6648, 6649 (AD, CANB, HO, NSW).
VICTORIA: mouth of Seal Creek, SW of Mallacoota, *Cameron* 199A, B, C, D, E, (AD, CANB, CBG, NSW).

Distribution. "Southern coastal New South Wales; coastal Victoria, discontinuously from near Mallacoota to Moonlight Head in western Victoria, with an isolated non coastal occurrence in the Grampians; Tasmania, on the northern and western coasts" (Carr 1980).

Habitat. "... confined to heaths or heathy woodlands within *c.* 8 km of the coast, except for an isolated occurrence in the Grampians... In the Grampians it usually occurs at lower altitudes than does subsp. *ramosissima*" (Carr 1980).

7. Euryomyrtus denticulata (Maiden & Betche) Trudgen, *comb. nov.*

Baeckea denticulata Maiden & Betche, *Proc. Linn. Soc. New South Wales* ser. 2, 34: 360 (1909). *Type:* Kybean, 3800 feet high, near the Kydra Trigonometrical Station, east of Nimitybelle, New South Wales, November 1908, *R.H. Cambage* (*holo:* NSW, *iso:* CANB, MEL).

Illustration. Plate xxxii, *Proc. Linn. Soc. New South Wales* ser. 2, 34 (1909).

Prostrate, mat forming "*shrub*" usually with slender branches and short divaricate branchlets. *Leaves* opposite, twisted into 2 rows in one plane, spreading to 90° from the branchlets; petiole 0.5–1.0 mm long; lamina slightly curved (rather than flat) with slightly recurved margins, elliptic to broadly elliptic, ovate or oblong, not thickened, 1.6–7.1 mm long, 1.1–3.3 mm wide, acute to obtuse, discolorous (paler below), smooth, green or reddish, oil glands visible on abaxial surface only, margins denticulate-ciliate (trichomes short, hyaline). *Flowers* 1–8 per branchlet on 1-noded terminal and axillary brachyblasts, each peduncle subtended by a reduced leaf, each peduncle subtended by a very reduced leaf 0.6–1.0 mm long, or rarely flowers solitary in the axil of a normal leaf; anthopodium 0.6–1.8 mm long peduncle 0.8–7.0 mm long, terminated by a pair of sub-opposite to alternate bracteoles (up to 0.5 mm apart); bracteoles broadly ovate, not thickened, very concave, attachment broad, 1.0–1.4 mm long, reddish, clasping young bud. *Hypanthium* narrowly to broadly obconic, 1.5–1.7 mm long, 1.3–2.0 mm diam., smooth, pale-coloured or a dull red; calyx lobes spreading, narrowly deltoid to deltoid, 1.5–1.7 mm long, not keeled, red, margin entire or with a few short hyaline trichomes. *Corolla* 5.5–7.0 mm diam., white to pale pink; petals broadly elliptic, ovate, oblong or sub-orbicular, claw very short. *Processes* absent. *Stamens* 19–25, one opposite each petal and calyx lobe the others between these. *Filaments* very slender, terete, tapering very slightly towards apex, not curved inwards at apex, antepetalous longest, markedly exceeding calyx lobes, 2.5–3.2 mm long, antesepalous shortest, 1.5–2.0 mm long. *Anthers c.* 0.3 mm long; connective gland sub-globular, *c.* 0.3 diam. *Ovary* 3-locular, lower third to half fused to hypanthium, top hemispherical, umbiculate, equalling staminophore; placentas slightly raised almost square areas on the floral axis, *c.* 0.2 mm long; ovules 2 per loculus, collateral, or rarely a third present. *Style* slender, tapering slightly towards stigma, inserted into top of ovary, equalling antepetalous anthers. *Mature fruit* unknown. *Seeds* not seen at maturity; aril present.

Specimens examined. NEW SOUTH WALES: head of Bumberry Creek, SW of Countegany, *D.F. Blaxell* 485 (MEL, NSW); Bumberry Creek on the Wadbilliga fire trail, 39 km ESE of Cooma, *R.G. Coveny* 6597, *P.D. Hind & M. Parris* (A, CANB, K, L, LE, MEL, MO, RSA); Kydra trigonometrical point, Kybean Range, 36° 25' S, 149° 31' E., *M. Parris* CBG 7907576 (CBG); Bumberry Creek crossing, Wadbilliga Gorge trail, *M. Parris* CBG 7907577 (CBG); Kosiusko National Park, Marangle Range, on Manjar fire trail between Manjar and Mt Black Jack, *M. Parris* CBG 850315 (CBG, NSW, PERTH); Conways Gap NE of Kybean, 36°16' S 149°32' E, *I.R. Telford* 8573 (CBG, NSW, PERTH); Kydra trigonometrical point, *c.* 40 km ESE of Cooma, *J.H. Willis* MEL72712 (MEL).

Distribution. Found only in a small area of south-western New South Wales with most specimens from near the Kydra trigonometrical point or from the nearby Bumberry creek and one from the Marangle Range near Mt Black Jack to the south-east.

Habitat. Known from under *Eucalyptus viminalis* and *E. pauciflora* on granite with *Grevillea victoriae, Acacia lucasii, A. rubida, Bursaria spinosa* and other shrubs and also from *Allocasuarina nana* heath where it was scrambling over rocks. It ocurrs in quite high areas, from 950–1300 m above sea-level.

Flowering time. Flowers through a considerable part of the year with flowering specimens having been collected in April, August, October and November.

Conservation status. Although only known from a few specimens from a restricted area *Euryomyrtus denticulata* is apparently locally common, notwithstanding this it is in need of surveying to determine its exact status, it is certainly very poorly collected and very restricted geographically.

Notes. Euryomyrtus denticulata is closest to *E. ramosissima* and has been confused with it, but differs in many respects, for example in the number of stamens.

Maiden & Betche (1909) placed *E. denticulata* in section *Euryomyrtus* of *Baeckea*, correctly recognizing its affinities. However they misinterpreted the terminal inflorescence, describing it as an umbel which they claimed as unique for *Baeckea*. However, they also gave an alternative description "flowers axillary in the crowded uppermost leaves which are reduced to bracts", a reasonably accurate description of the brachyblast inflorescence which is also found in all other *Euryomyrtus* species except *E. maidenii* and *E. patrickiae*. In *E. denticulata* a flowering branchlet may have just a terminal brachyblast or a terminal brachyblast and up to four axillary brachyblasts. The growing tips of the brachyblasts often grow on, before flowering is finished, producing normal leaves.

The holotype bears the date "4-11-08" and collector's number 1990, which were not quoted in the original description. In a separate publication the collector noted "An interesting Baeckea (No. 1990) was found plentifully over the sandy conglomerate hills, at elevations up to 4,00 feet. The plant is quite prostrate, speading from 1–2 feet across, and early in November is charmingly crested with a profusive display of white flowers, in some cases very faintly tinged with pink." (Cambage 1909).

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